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System and Method for Anonymous Message Forwarding and Anonymous Voting

BACKGROUND OF THE INVENTION

1. Technical Field

5   The present invention relates in general to a method and system for receiving mail without the identity of the sender.   More particularly, the present invention relates to a system and method for using a mail forwarding architecture to remove the identity of an individual when

10   casting an election ballot.

2. Description of the Related Art

The ability to send a message without identifying the sender of the message has many useful purposes.   For example, an employee may provide more honest feedback to

15   employer questionnaires if the employee is confident that his identity is not revealed.   Another example of when an individual may not want his identity revealed is when he is filing a complaint about a neighbor to a homeowner association.   He may want to have his complaint heard, but

20   may not want to create hardship between him and his neighbor.

Voting is also a time when an individual may want to be anonymous.   Voter turnout has been an ongoing concern and many attempts have been made to increase the percentage

25   of people voting.   Many individuals are working during the day and have family activities in the evening.   People are also accustomed to performing business activity electronically, such as through email.   Voters often become

frustrated standing in long lines during the voting day to cast a vote. The existing voting systems are not accommodating to the way people perform modern business electronically. Voter turnout may be increased if a voter

5 is able to vote over a computer network, such as the Internet, during any time of the voting day.

A challenge found with existing art is to ensure a voter's identity is not revealed, and at the same time log who is voting so the number of times a person votes is

10 tracked. Another challenge with existing art is that the receiving server of anonymous email systems do not have the ability to manage who sends anonymous emails and how often. Receiving servers may not have the ability to inform forwarding servers which emails should be blocked, and

15 which emails should be forwarded. Receiving servers may also not have the ability to inform the forwarding server how many times an individual may vote. This helps protect the recipient mail client against mail overload, or denial of service attacks.

20 Another challenge found with existing art is that existing architectures have a solution for mail forwarding, but not anonymous processing. Others deal with anonymous processing, but do not log who sends the email and how often. More challenges found with existing art are that

25 some require a sender to use a specialized ISP or mail service and do not use a forwarding server that is used as a management construct.

What is needed, therefore, is a message forwarding architecture that has administrative options available to

30 the recipient mail client.

SUMMARY

It has been discovered that by providing a mail forwarding architecture that manages and records relevant sender information while providing an anonymous message to be sent to a receiving server, a benefit is achieved by the receiving server. A voter mailing procedure is initiated by either the receiving server or forwarding server. The voter mailing procedure may be performed electronically as well as performed through a mail service such as the United States Postal Service for voters that do not have access to electronic mail.

Voters receive the vote requests and cast their votes through a private client, such as a home computer, or a public client such as a computer in a voting booth at a public library. Voters can also use a telephone to access the system and cast their votes.

The forwarding server receives a vote selection from an individual. The mail forwarding server retrieves authorized voter information and administrative options from a database. The forwarding server may have administrative options that are specified by the receiving server. For example, the receiving server may want to limit the number of times a single individual (or authorized email address) can vote in order to prevent a multiple voting email overload, or denial of service attack. The forwarding server determines whether the individual who sent the vote selection is authorized to vote. If the individual is authorized to vote, the forwarding server logs the individual and removes the

identity from the vote selection. Removing the identity may include the senders name and email address, reply-to name, IP address of the sender, IP address of the sender's ISP, and timestamp information. Once the identity is

5 removed, the forwarding server sends the anonymous vote selection to the receiving server. The forwarding server may also retain individual vote selections and send a single file to the receiving server that includes a summation of vote selections. The receiving server

10 tabulates the votes and selects a winner of the election based on the tabulation. There may be multiple receiving servers in cases where each precinct or county is implemented with a separate server.

This invention provides an asynchronous solution that

15 can leverage security standards, such as Secure/multipurpose Internet Mail Extensions (S/MIME), as part of its solution architecture.

The foregoing is a summary and thus contains, by necessity, simplifications, generalizations, and omissions

20 of detail; consequently, those skilled in the art will appreciate that the summary is illustrative only and is not intended to be in any way limiting. Other aspects, inventive features, and advantages of the present invention, as defined solely by the claims, will become

25 apparent in the non-limiting detailed description set forth below.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention may be better understood, and its numerous objects, features, and advantages made apparent to those skilled in the art by referencing the

5   accompanying drawings. The use of the same reference symbols in different drawings indicates similar or identical items.

Figure 1 is a diagram of a mail forwarding architecture with a receiving server sending voter requests;

10   **Figure 2** is a diagram of a mail forwarding architecture with a forwarding server sending voter requests;

Figure 3 is a high level flow chart showing voter request being sent out and responses received;

Figure 4 is a flow chart showing a forwarding server

15   receiving votes, removing the voter identity, and sending a file to a receiving server;

Figure 5 is a flow chart showing a forwarding server receiving votes, removing the voter identity, and sending the anonymous vote to a receiving server; and

20   **Figure 6** is a block diagram of an information handling system capable of implementing the present invention.

DETAILED DESCRIPTION

The following is intended to provide a detailed description of an example of the invention and should not be taken to be limiting of the invention itself. Rather, any number of variations may fall within the scope of the invention which is defined in the claims following the description.

Figure 1 is a diagram of a mail forwarding architecture with a receiving server sending voter requests. Those skilled in the art can appreciate that this architecture can be used for other activities besides voting where anonymous mail is preferred. For example, this architecture can be used to construct an employee feedback system or homeowner feedback system.

Receiving server **100** initiates a voting poll by sending out Vote Request Mail-out **110** and electronic vote request **115**. Vote Request Mail-out **110** is sent to Postal Service **112** for delivery through a mail service, such as the United States Postal Service. Vote request mail-outs may be sent to individuals that do not have access to electronic mail or in circumstances where physical mailing is preferred. Vote request mail-outs sent through a postal service may also be sent to each authorized voter regardless of electronic mail capability to increase the chances of voter turnout. Vote request mail-outs may provide additional voting instructions, such as locations of public voting clients and other voting instructions. Electronic vote request **115** is sent to mail server **125**. Mail server **125** sends the vote request to computer network

130 such as the Internet. The vote request is sent through Computer Network 130 to mail server 172, which delivers vote request 174 to Private Client 176. Private Client 176 may be a client that has electronic mail capability for a

5 particular individual who is authorized to vote, either in a company or at home. Vote request 115 includes voting instructions and may include an electronic ballot, or template that the recipient can use to initiate one or more votes. The authorized voter who has electronic mail

10 capability for Private Client 176 receives the vote request, and casts his vote with a responsive email message. The role of Vote Request 187 in the context of Public Client(s) 185 is to allow specialized software to process inputs and outputs related to the ballot that is

15 displayed to the user.

The identity of Private Client 176 and vote responses are included in Identified Response 178, which is sent to Mail Server 172. Mail Server 172 sends the identified response through Computer Network 130 to Mail Server 170.

20 Mail Server 170 sends Identified Response 160 to Forwarding Server 135 for processing. Forwarding server 135 retrieves voter information from voter data store 140 and determines whether Identified Response 160 is from an authorized voter. For example, voter authorization may be performed

25 by looking up an e-mail address or by including an authorized digital certificate or digital signature in the e-mail.

Forwarding Server 135 may also receive phone-in responses from voters that do not cast votes by electronic

30 mail. For example, voters may use the telephone to cast a vote using the telephone if they receive a vote request

from the post office and do not have access to electronic mail.   Phone-in User **145** sends Identified Response **150** through Public Switch Telephone Network (PSTN) **155** to Forwarding Server **135**.   Forwarding Server **135** also

5 retrieves Phone-in User information from voter data store **140**.   Identified Response **150** includes a vote selection of Phone-in user **145** and identity information such as an employee identification number, social security number, or account number.   In addition, a password such as a Personal

10 ID Number (PIN) can be used for added security.   The identity of the voter is used to determine authorization privileges.

Forwarding server **135** may also receive vote responses from Public Client(s) **185** which may be sent from a voting

15 booth located in a library or other publicly accessible place.   An authorized voter enters the voting booth and inputs his unique identification number such as a social security number or account number, and vote selection into Public Client **185**.   In addition, a password such as a

20 Personal ID Number (PIN) can be used for added security. Public Client **185** sends Identified Responses **190** to Mail Server **180**.   Mail Server **180** sends the identified response through Computer Network **130** to Mail Server **170**.   Mail Sever **170** sends Identified Response **160** to Forwarding

25 Server **135**.   Forwarding server **135** retrieves voter information from Data **140** and determines whether Identified Response **160** is from an authorized voter.   Since Identified Response **160** is generated from Public Client **185**, Forwarding Server **135** may not be able to use an e-mail

30 address look-up to determine authorization, but may use information such as the user's identification number,

social security number, PIM code, or account number that uniquely identifies the user and is included in Identified Response **160**.

5   When Forwarding Server **135** receives an authorized voter response from either Private Client **176**, Public Client **185**, or Phone-in User **145**, Forwarding Server **135** removes the voter identity of the response and sends Un-Identified Response **165** to Mail Server **170**. Forwarding Server **135** may send Un-identified Response **165** for each

10   voter response, or Forwarding Server **135** may store voter responses and send a single un-identified response which includes the summation of vote selections received. Mail Server **170** sends Un-Identified Response **165** through Computer Network **130** to Mail Server **125**. Receiving Server

15   **100** verifies that Un-Identified Response **120** is from Forwarding Server **135** by using public/private key encryption or other security mechanisms. Un-Identified Response **120** is received by Receiving Server **100**, which analyzes the vote response and stores it in Data Store **105**.

20   **Figure 2** is a diagram of a mail forwarding architecture with a forwarding server sending voter requests. In **Figure 2**, the forwarding server is responsible for sending voter mail-outs, whereas in **Figure 1** the receiving server is responsible for sending voter requests.

25   Forwarding server **235** initiates a voting poll by sending out Vote Request Mail-out **210** and electronic vote request **215**. Vote Request Mail-out **210** is sent to Postal Service **212** for delivery through a mail service, such as the United States Postal Service. Vote request mail-outs

30   may be sent to individuals who do not have access to

electronic mail or in circumstances where physical mailing is preferred.   Vote request mail-outs sent through a postal service may also be sent to each authorized voter regardless of electronic mail capability to increase the

5 chances of voter turnout or to satisfy election requirements.   Vote request mail-outs may provide additional voting instructions, such as locations of public voting clients and other voting instructions.   Electronic vote request **215** is sent to mail server **270**.   Mail server

10 **270** sends the vote request through computer network **230** to mail server **272**, which delivers vote request **274** to Private Client **276**.   Private Client **276** may be a client that has electronic mail capability for a particular individual who is authorized to vote, either in a company or at home.

15 Vote request **215** includes voting instructions and may include an electronic ballot, or template that the recipient can use to initiate one or more votes.   The authorized voter who has electronic mail capability for Private Client **276** receives the vote request, and casts his

20 vote with a responsive email message.   The role of Vote Request **287** in the context of Public Client(s) **285** is to allow specialized software to process inputs and outputs related to the ballot that is displayed to the user.

The identity of Private Client **276** and vote response

25 are included in Identified Response **278**, which is sent to Mail Server **272**.   Mail Server **272** sends the identified response through Computer Network **230**, to Mail Server **270**. Mail Server **270** sends Identified Response **260** to Forwarding Server **235** for processing.   Forwarding server **235** retrieves

30 voter information from voter data store **240** and determines whether Identified Response **260** is from an authorized

voter. For example, voter authorization may be performed by looking up an e-mail address or by including an authorized signature certificate in the e-mail.

Forwarding Server **235** may also receive phone-in
5   responses from voters that do not cast votes by electronic mail. For example, voters may use the telephone to cast a vote using the telephone if they receive a vote request from the post office and do not have access to electronic mail. Phone-in User **245** sends Identified Response **250**
10 through Public Switch Telephone Network (PSTN) **255** to Forwarding Server **235**.   Forwarding Server **235** also retrieves Phone-in user information from Data Store **240**. Identified Response **250** includes a vote of Phone-in user **245** and identity information such as an employee
15 identification number, social security number, or account number. In addition, a password such as a Personal ID Number (PIN) can be used for added security. The identity of the voter is used to determine authorization privileges.

Forwarding server **235** may also receive vote responses
20 from Public Client(s) **285** which may be sent from a voting booth located in a library or other publicly accessible place. An authorized voter enters the voting booth and inputs his unique identification number, such as an employee number, social security number, or account number,
25 and vote selection into Public Client **285**. In addition, a password such as a Personal ID Number (PIN) can be used for added security. Public Client **285** sends Identified Responses **290** to Mail Server **280**. Mail Server **280** sends the identified response through Computer Network **230** to
30 Mail Server **270**. Mail Server **270** sends Identified Response **260** to Forwarding Server **235**. Forwarding server **235**

retrieves voter information from Data **240** and determines whether Identified Response **260** is from an authorized voter. Since Identified Response **260** is generated from Public Client **285**, Forwarding Server **235** may not be able to

5   use an e-mail address look-up to determine authorization, but may use information such as the employee's identification number, social security number, PIN codes, or account number that uniquely identifies the user and is included in Identified Response **260**.

10   When Forwarding Server **235** receives an authorized voter response from either Private Client **276**, Public Client **285**, or Phone-in User **245**, Forwarding Server **235** removes the voter identity of the response and sends Un-Identified Response **265** to Mail Server **270**. Forwarding

15 Server **235** may send Un-identified Response **265** for each voter response, or Forwarding Server **235** may store voter responses and send a single un-identified response which includes the summation of vote selections received. Mail Server **270** sends Un-Identified Response **265** through

20 Computer Network **230** to Mail Server **225**. Receiving Server **200** verifies that Un-Identified Response **220** is from Forwarding Server **235** by using public/private key encryption or other security mechanisms. Un-Identified Response **220** is received by Receiving Server **200**, which

25 analyzes the vote response and stores it in Data Store **205**.

    Figure 3 is a high level flow chart showing voter requests being sent out and responses received. Processing commences at **300**, whereupon a list of authorized voters is compiled along with voting criteria. For example, voting

30 criteria may allow voters to vote multiple times, or a single time.

The authorized voter list and voting criteria are sent to Mail Forwarding Service **315** (step **310**). The mail forwarding service is responsible for adhering to the voting criteria and allowing authorized voters to cast

5 their vote. Electronic Mailing **325** and Post Office **330** send out vote requests (step **320**). For example, a company may send out vote requests to its employees or shareholders by electronic mail. However, some recipients may not have the ability to access electronic mail. The company may

10 mail out a voter request to those individuals through the post office.

A determination is made as to whether the receiving server will receive one file of tabulated votes from the mail forwarding service or will receive multiple messages

15 (decision **335**). If the receiving server will receive one file, decision **335** branches to "Yes" branch **340** whereupon Mail Forwarding Service (MFS) Compilation is processed (pre-defined process block **345**, see **Figure 4** for further details). For example, the receiving server may instruct

20 the forwarding server to manage the voting tabulation and receive a file with the tabulated voting results. On the other hand, if the receiving server will receive each anonymous email from the mail forwarding service and perform voting tabulation itself, decision **335** branches to

25 "No" branch **350** whereupon MFS Forwarding processing is performed (pre-defined process block **355**, see **Figure 5** for further details). Processing voter requests ends at **370**.

Figure 4 is a flow chart showing a forwarding server receiving votes, removing the voter identity, and sending a

30 file to a receiving server. Voter processing commences at **400**, whereupon a voter sends a vote to the forwarding

server (step **405**).   A determination is made as to whether
the voter will receive a confirmation of his vote being
processed by the forwarding server (decision **410**).   If a
confirmation will not be sent, decision **410** branches to
5   "No" branch **412** whereupon voter processing ends at **420**.   On
the other hand, if a confirmation will be sent, decision
414 branches to "Yes" branch **414** whereupon processing waits
for a confirmation (step **416**).   Once the confirmation is
received at step **416**, voter processing ends at **420**.

10   Mail forwarding server processing commences at **425**,
whereupon the forwarding server receives a vote (step **430**).
The voter identity is retrieved from voter data store **440**
(step **435**).   Voter data store **440** includes a log of who is
authorized to vote and how many times a voter can vote.   A
15   determination is made as to whether the voter is authorized
to vote (decision **445**).   For example, an authorization may
be determined from an email address or determined from an
authorized digital certificate or digital signature.   It
may also come from a voter entering a unique identifier and
20   password on a touch-tone phone.

If the voter is not authorized to vote, decision **445**
branches to "No" branch **447** whereupon the vote is
disregarded (step **448**).   On the other hand, if the voter is
authorized to vote, decision **445** branches to "Yes" branch
25   **449** whereupon the voter identity is logged in voter data
store **440** (step **450**).   The voter identity is removed at
step **452**.   Removing voter identity may include removing the
email address of the voter and relevant IP address
information.   The cast vote is stored in tabulated votes
30   store **458** (step **455**).   A determination is made as to
whether a confirmation is feasible and requested by the

voter to notify him that his vote is accepted or rejected (decision **460**). For example, a confirmation may be feasible if a voter sent a vote from a private computer, but not feasible if a voter sent a vote from a public computer in a public library. In order to send a confirmation to an authorized voter whose identity has been removed, the voters' identity may have to be retrieved from the voter log file or retained in memory until the confirmation message has been sent.

If a confirmation will be sent, decision **460** branches to "Yes" branch **462** whereupon a confirmation is sent to the voter (step **463**). The voter receives the confirmation at step **416**, and voter processing ends at **420**. On the other hand, if a confirmation will not be sent, decision **460** branches to "No" branch **464** whereupon a determination is made as to whether there are more votes (decision **465**). This decision may be based on a time restriction (i.e. no votes after 4pm on November 4th). If there are more votes, decision **465** branches to "Yes" branch **468** which loops back to wait for another vote. This looping continues until there are no more votes, at which point decision **465** branches to "No" branch **467** whereupon the tabulated votes data store file is sent to the receiving server (step **463**) and mail forwarding processing ends at **470**.

Receiving server processing commences at **475**, whereupon the receiving server receives tabulated votes **458** from the forwarding server (step **480**). The receiving server adds the votes to voter data store **484** (step **482**). A determination is made as to whether there are more votes (decision **486**). The receiving server may be receiving tabulated votes from many forwarding servers. For example,

each forwarding server may collect votes for a certain precinct or area. If there are more tabulated votes, decision **486** branches to "Yes" branch **488** which loops back to receive more tabulated votes from other forwarding

5   servers. This looping continues until no more tabulated votes are received, at which point decision **486** branches to "No" branch **490**. Voting results are further tabulated (step **492**), election winners are selected (step **494**), and receiving server processing ends at **496**.

10   **Figure 5** is a flow chart showing a forwarding server receiving votes, removing the voter identity, and sending the anonymous vote to a receiving server. Voter processing commences at **500**, whereupon a voter sends a vote to the forwarding server (step **505**). A determination is made as

15   to whether the voter will receive a confirmation of his vote being processed by the forwarding server (decision **510**). If a confirmation will not be sent, decision **510** branches to "No" branch **512** whereupon voter processing ends at **520**. On the other hand, if a confirmation will be sent,

20   decision **514** branches to "Yes" branch **514** whereupon processing waits for a confirmation (step **516**). Once the confirmation is received at step **516**, voter processing ends at **520**.

       Mail forwarding server processing commences at **525**,

25   whereupon the forwarding server receives a vote (step **530**). The voter identity is retrieved from voter data store **540** (step **535**). Voter data store **540** includes a log of who is authorized to vote and how many times a voter can vote. A determination is made as to whether the voter is authorized

30   to vote (decision **545**). For example, an authorization may be determined from an email address or determined from an

authorized digital certificate or digital signature. It may also come from a voter entering a unique identifier and password on a touch-tone phone.

If the voter is not authorized to vote, decision **545** branches to "No" branch **547** whereupon the vote is disregarded (step **548**). On the other hand, if the voter is authorized to vote, decision **545** branches to "Yes" branch **549** whereupon the voter identity is logged in voter data store **540** (step **550**). The voter identity is removed at step **552**. Removing voter identity may include removing the email address of the voter and relevant IP address information. The anonymous vote is sent to the receiving server (step **555**). A determination is made as to whether a confirmation is feasible and requested by the voter to notify him that his vote is accepted or rejected (decision **560**). For example, a confirmation may be feasible if a voter sent a vote from a private computer, but not feasible if a voter sent a vote from a public computer in a public library. In order to send a confirmation to an authorized voter whose identity has been removed, the voters' identity may have to be retrieved from the voter log file or retained in memory until the confirmation message has been sent.

If a confirmation will be sent, decision **560** branches to "Yes" branch **562** whereupon a confirmation is sent to the voter (step **563**). The voter receives the confirmation at step **516**, and voter processing ends at **520**. On the other hand, if a confirmation will not be sent, decision **560** branches to "No" branch **564** whereupon a determination is made as to whether there are more votes (decision **565**). This decision may be based on a time restriction (i.e. no

votes after 5pm on November 4th). If there are more votes, decision **565** branches to "Yes" branch **568** which loops back to wait for another vote. This looping continues until there are no more votes, at which point decision **565**

5 branches to "No" branch **567** whereupon forwarding processing ends at **570**.

Receiving server processing commences at **575**, whereupon the receiving server receives an anonymous vote from the forwarding server (step **580**). The receiving

10 server adds the votes to voter data store **584** (step **582**). A determination is made as to whether there are more votes (decision **586**). This decision may be based on a time restriction (i.e. no votes after 5pm on November **4**th). If there are more votes, decision **586** branches to "Yes" branch

15 **588** which loops back to receive more votes from the mail forwarding server. This looping continues until no more votes are received, at which point decision **586** branches to "No" branch **590**. Voting results are tabulated (step **592**), a winner is selected (step **594**), and receiving server

20 processing returns at **596**.

Figure 6 illustrates information handling system **601** which is a simplified example of a computer system capable of performing the server and client operations described herein. Computer system **601** includes processor **600** which

25 is coupled to host bus **605**. A level two (L2) cache memory **610** is also coupled to the host bus **605**. Host-to-PCI bridge **615** is coupled to main memory **620**, includes cache memory and main memory control functions, and provides bus control to handle transfers among PCI bus **625**, processor

30 **600**, L2 cache **610**, main memory **620**, and host bus **605**. PCI bus **625** provides an interface for a variety of devices

including, for example, LAN card **630**. PCI-to-ISA bridge **635** provides bus control to handle transfers between PCI bus **625** and ISA bus **640**, universal serial bus (USB) functionality **645**, IDE device functionality **650**, power

5 management functionality **655**, and can include other functional elements not shown, such as a real-time clock (RTC), DMA control, interrupt support, and system management bus support. Peripheral devices and input/output (I/O) devices can be attached to various

10 interfaces **660** (e.g., parallel interface **662**, serial interface **664**, infrared (IR) interface **666**, keyboard interface **668**, mouse interface **670**, and fixed disk (HDD) **672**) coupled to ISA bus **640**. Alternatively, many I/O devices can be accommodated by a super I/O controller (not

15 shown) attached to ISA bus **640**.

BIOS **680** is coupled to ISA bus **640**, and incorporates the necessary processor executable code for a variety of low-level system functions and system boot functions. BIOS **680** can be stored in any computer readable medium,

20 including magnetic storage media, optical storage media, flash memory, random access memory, read only memory, and communications media conveying signals encoding the instructions (e.g., signals from a network). In order to attach computer system **601** to another computer system to

25 copy files over a network, LAN card **630** is coupled to PCI bus **625** and to PCI-to-ISA bridge **635**. Similarly, to connect computer system **601** to an ISP to connect to the Internet using a telephone line connection, modem **675** is connected to serial port **664** and PCI-to-ISA Bridge **635**.

While the computer system described in **Figure 6** is capable of executing the invention described herein, this computer system is simply one example of a computer system. Those skilled in the art will appreciate that many other

5   computer system designs are capable of performing the invention described herein.

One of the preferred implementations of the invention is an application, namely, a set of instructions (program code) in a code module which may, for example, be resident

10   in the random access memory of the computer.   Until required by the computer, the set of instructions may be stored in another computer memory, for example, on a hard disk drive, or in removable storage such as an optical disk (for eventual use in a CD ROM) or floppy disk (for eventual

15   use in a floppy disk drive), or downloaded via the Internet or other computer network. Thus, the present invention may be implemented as a computer program product for use in a computer.   In addition, although the various methods described are conveniently implemented in a general purpose

20   computer selectively activated or reconfigured by software, one of ordinary skill in the art would also recognize that such methods may be carried out in hardware, in firmware, or in more specialized apparatus constructed to perform the required method steps.

25   While particular embodiments of the present invention have been shown and described, it will be obvious to those skilled in the art that, based upon the teachings herein, changes and modifications may be made without departing from this invention and its broader aspects and, therefore,

30   the appended claims are to encompass within their scope all

such changes and modifications as are within the true spirit and scope of this invention. Furthermore, it is to be understood that the invention is solely defined by the appended claims. It will be understood by those with skill

5   in the art that if a specific number of an introduced claim element is intended, such intent will be explicitly recited in the claim, and in the absence of such recitation no such limitation is present. For a non-limiting example, as an aid to understanding, the following appended claims contain

10   usage of the introductory phrases "at least one" and "one or more" to introduce claim elements. However, the use of such phrases should not be construed to imply that the introduction of a claim element by the indefinite articles "a" or "an" limits any particular claim containing such

15   introduced claim element to inventions containing only one such element, even when the same claim includes the introductory phrases "one or more" or "at least one" and indefinite articles such as "a" or "an"; the same holds true for the use in the claims of definite articles.